Effective interventions for lifestyle change after myocardial infarction or coronary artery revascularization

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Abstract:

Purpose: This science clinical paper reviews medical literature and examines interventions that are currently used to assist patients in achieving lifestyle change after myocardial infarction or coronary artery revascularization. Interventions that focused on both provider- and patient-implemented strategies were included. The effectiveness of these interventions to significantly reduce coronary heart disease risk factors was explored.

Data sources: Original longitudinal research studies or reviews indexed in PubMed between 1999 and 2004 were included. Eight studies were identified that met the inclusion criteria and presented successful interventions to increase participants' adherence to recommended lifestyle changes.

Conclusions: Current strategies for achieving recommended risk factor reductions include frequent follow-up, intensive diet changes, individualized and group exercise, coaching, group meetings, education on lifestyle modification and behavior change, and formal cardiac rehabilitation programs.

Implications for practice: Nurse Practitioners can help close the gap between evidence-based recommendations and clinical practice by implementing education programs in their practices and in the community. Recommendations include frequent follow-up visits, negotiating personalized treatment plans, and a general emphasis on therapeutic lifestyle change as an essential component of the treatment plan.

Keywords: Coronary artery disease | coronary heart disease | therapeutic lifestyle change | risk reduction | treatment gap | myocardial infarction

Article:

Introduction

Coronary heart disease (CHD) is the leading cause of death for both men and women in the United States, killing more than 500,000 Americans in 2001. Although the CHD death rate decreased 46% from 1981 to 2001, acute myocardial infarction (MI) remains the leading cause of CHD mortality, representing 20% of all CHD deaths in 2001. Thirteen million Americans are living with CHD (National Heart, Lung, & Blood Institute, 2003), with an estimated 700,000 experiencing a new MI and 500,000 with recurrent MIs in 2004. Survivors of the acute stage of MI have a risk of illness and death as much as 15 times higher than the general population, and approximately two thirds fail to make a complete recovery (American Heart Association, 2003). Consequently, patients with preexisting CHD are the first priority in preventive cardiology.

A multitude of known CHD risk factors exist, including male sex, increasing age, family history of CHD, diabetes mellitus, cigarette smoking, hypertension (HTN), dyslipidemia, overweight and obesity, lack of physical activity, alcohol use, and dietary factors such as high salt and fat intake (Khot et al., 2003; Pearson et al., 2002; Stamler et al., 1999; United States Department of Health and Human Services [U.S. DHHS], 2000). Many of these risk factors are not limited to an association with CHD; they also contribute to increased risk for other leading causes of death such as stroke, cancer, and lung diseases. In addition, several risk factors are correlated. For example, decreased physical activity not only independently increases CHD risk but also increases the risk of obesity, HTN, dyslipidemia, and diabetes, each of which further intensifies CHD risk (Pearson et al., 2002; U.S. DHHS).

Several studies have demonstrated that the reduction of risk factors is still effective in decreasing both recurrent coronary events and cardiovascular disease mortality in patients who have already experienced MI or coronary artery revascularization (Ornish et al., 1990, 1998; Sdringola et al., 2003; Wallner et al., 1999). Therefore, CHD risk factor identification and treatment, including therapeutic lifestyle change, is crucial to managing the care of patients with preexisting CHD.

Despite healthcare providers' efforts to manage risk factors and the many campaigns and strategies employed to inform the public, the vast majority of patients with CHD (85%–100%) have at least one significant modifiable risk factor (defined as cigarette smoking, HTN, diabetes, or hyperlipidemia) (Greenland et al., 2003; Khot et al., 2003; Stamler et al., 1999). There is a "treatment gap" between what is recommended based on scientific evidence and the reality of clinical practice (Pearson, Laurora, Chu, & Kafonek, 2000; The EUROASPIRE Study Group, 1997). This paper will present strategies for closing the treatment gap through effective therapeutic lifestyle change.

Purpose

This paper reviews the medical literature and examines interventions that are currently used to assist patients in achieving lifestyle change after MI or coronary artery revascularization. Because achieving lifestyle change requires the expertise of the provider and cooperation from the patient, interventions that focused on both provider- and patient-implemented strategies were included. The effectiveness of these interventions to significantly reduce CHD risk factors was explored. Lastly, implications for nurse practitioners (NPs) and recommendations for best clinical practices are discussed.

Method

A PubMed search was conducted using the key words myocardial ischemia, myocardial revascularization, health behavior, and patient education with the subheadings prevention and control, diet therapy, and rehabilitation. Only original longitudinal research studies or reviews with the following characteristics were considered: studies involving adult human participants of both sexes over age 18 years diagnosed with MI, coronary artery revascularization (by coronary artery bypass graft [CABG] or percutaneous coronary intervention [PCI]), or both who participated in an intervention designed to increase participants' adherence to recommended lifestyle changes and were published in English between 1999 and 2004. Studies that evaluated the effectiveness of medication therapy on modifiable risk factors were excluded. Eight studies with successful interventions were included in the review. Interventions were considered successful if they produced statistically significant, clinically relevant changes in measurable risk factors.

Literature review

The Lifestyle Heart Trial was the first randomized controlled clinical trial evaluating the effects of therapeutic lifestyle change on the regression of coronary atherosclerosis. Its demonstration by angiography that significant reductions in coronary stenosis were possible began the researcher's quest to determine which lifestyle behaviors should be given priority for change and the degree of intensity required to delay progression or induce regression of CHD (Ornish et al., 1990).

Wallner et al. (1999) examined the need for additional revascularization procedures in patients after PCI who implemented Ornish-based therapeutic lifestyle change. Sixty patients with successful PCI were randomly assigned to either a therapeutic lifestyle change intervention group or a control group and were blinded to their assignment. Successful PCI was defined as postprocedure stenosis less than 50% without restenosis in 24 h. Both groups received identical diet and lifestyle advice from a nutritionist at baseline. The control group received usual care from a general practitioner and was seen every 3 months, while the intervention group had 1-h Ornish program sessions with the nutritionist every week for 1 month, every 2 weeks for 2 months, then monthly until 12 months. Blood samples were collected from both groups at baseline and 12 months, and 4-day food records were obtained from intervention group participants at each nutritionist visit. All patients were treated by the study cardiologist if clinical signs of ischemia developed. The need for revascularization by either CABG or PCI was determined by a study cardiologist who was blinded to group assignment. The mean observation time was 26 months. This extended observation time, combined with random assignment, blinding of the participants and study cardiologist, and recruitment of enough participants to detect a 35% risk reduction with a power of 90%, is a major strength of the study.

Despite having more previous MIs, higher systolic blood pressure (BP), and higher physical activity compared to the control group at baseline, the intervention group significantly improved physical activity; total, saturated, and monounsaturated fat intake; carbohydrate and fiber intake; and dietary cholesterol. Body mass index (BMI), lean body mass, body fat, systolic BP, diastolic BP, total cholesterol (TC), and low-density lipoprotein (LDL) cholesterol all improved in the intervention group at 12 months compared to baseline, with $p < .01$ (see 1Table 1). During the study period, 17 revascularization procedures were required, 3 in the intervention group and 14 in the control group, with two participants in the control group experiencing both an additional PCI and a CABG. Therapeutic lifestyle changes made by the intervention group participants resulted in a 74% decrease in the need for coronary artery revascularization, with $p < .01$ (Wallner et al., 1999).

Table 1. Selected Results from Noncomparative Studies

Study	Sample and Setting	Intervention	Improved	Nonsignificant
Lisspers et al. (1999)	*N* = 292, inpatient and outpatient settings in rural Sweden	Health education, behavior change, skills training, practicing new habits, group and individual counseling, relapse prevention, RN coaching	Exercise capacity and frequency, TC, triglycerides, LDL/HDL ratio, BMI, smoking	
Wallner et al. (1999)	*N* = 60, metabolism clinic in teaching hospital in Austria	Diet and lifestyle advice from nutritionist per Ornish program, individualized interview	Exercise, cholesterol intake, total, saturated, and monounsaturated fat intake, SBP, DBP, event-free survival, BMI, lean body mass, TC, LDL	Triglycerides, HDL
Masley, Phillips, and Copeland (2001)	*N* = 97 (control group, *n* = 48; intervention group, *n* = 49) four community outreach clinics	Group visits, diet classes taught by LPN, written educational information	Fruit/vegetable intake, use of monounsaturated oils, LDL	TC/HDL ratio, triglycerides, HDL
Gleason, Bourdet, Koehn, Holay, & Schaefer (2002)	*N* = 35, outpatient lipid and heart disease clinic	Home-delivered prepared meals and snacks, telephone diet education	TC, LDL, weight, BMI	Triglycerides, HDL
Vale et al. (2002)	*N* = 245 (control group, *n* = 124; intervention group. *n* = 121) teaching hospital in Melbourne, Australia	Coaching intervention with assessment and goal setting delivered by telephone	TC, LDL, and % at TC goal	HDL
Vale et al. (2003)	*N* = 792 (control group, n = 394; intervention group, *n* = 398) six teaching hospitals in Melbourne, Australia	Coaching intervention with assessment and goal setting delivered by telephone	Weight, BMI, TC, LDL, total fat, saturated fat, and cholesterol intake, walking frequency	Triglycerides, HDL, fasting blood glucose, smoking

Note. SBP, systolic blood pressure; DBP, diastolic blood pressure; RN, registered nurse; LPN, licensed practical nurse; TC, total cholesterol; LDL, low-density lipoprotein; BMI, body mass index; HDL, high-density lipoprotein.

Aldana et al. (2003) also studied the effects of the Ornish program but compared it with traditional cardiac rehabilitation and a control group in participants with MI and either CABG or PCI. After watching a video that described both intervention programs, participants self-selected their group. Data were collected at baseline, 3 months, and 6 months, including fasting lipid levels, glucose, diet, weight, BMI, waist to hip ratio, BP, angina severity, 3-day diet diaries, and exercise questionnaires. There were no significant differences between the groups at baseline except that the control group had lower high-density lipoprotein (HDL) cholesterol. Limitations of the study included the use of a convenience sample, the self-selection of participants into groups, and the additional motivation provided by giving participants $50 at each study visit. The authors acknowledged the possible bias income levels may have had in the participants' selection of a group and randomly matched those in the Ornish group with those in the rehabilitation and control groups to create sets of triplets to be used in all analyses.

Both intervention groups showed improvements in risk factors after 6 months. Although the cardiac rehabilitation participants had significant reduction in waist to hip ratios and increased HDL cholesterol, the Ornish program participants significantly improved BMI, weight, systolic BP, TC, LDL, fasting glucose, and dietary fat intake compared to the cardiac rehabilitation and control groups. Cardiac rehabilitation participants' weight, BMI, and BP significantly worsened, while the control group's risk factors either worsened or did not change. Medication use was not measured or factored into the results. Although cardiac rehabilitation participants made greater improvements than the control group, the comprehensive therapeutic lifestyle change made by participants in the Ornish program was the most effective in reducing risk factors (Aldana et al., 2003).

Gordon et al. (2002) also found risk factor reductions in patients with MI, CABG, PCI, or angina who participated in traditional cardiac rehabilitation when comparing cardiac rehabilitation with physician-supervised nurse case management and a community-based exercise program run by exercise physiologists. All three interventions successfully decreased risk factors, with significant improvements in systolic and diastolic BP, TC, LDL cholesterol, and weight. There were no statistical differences in risk factor improvement between the three groups. Significant improvement in triglycerides was seen in patients in the cardiac rehabilitation and community-based groups who had abnormal baseline values (see 2Table 2). There was no control group for comparison.

Table 2. Selected Results from Comparative Studies

Study	Sample and Setting	Intervention	Group	Improved	Worsened	Nonsignificant
Gordon et al. (2002)	*N* = 142 (*n* = 45) Southern hospital	Cardiac rehabilitation by AHA guidelines	Rehabilitation	SBP, DBP, TC, LDL, weight		Smoking, HDL, triglycerides
	n = 52, outpatient office complex	Office visits with RN and supervising MD, RN phone visits	Nurse case managed	SBP, DBP, TC, LDL, weight		Smoking, HDL, triglycerides
	n = 45, mall or office complex setting	On-site or telephone counseling (per patient preference) by exercise physiologists	Community based	SBP, DBP, TC, LDL, weight		Smoking, HDL, triglycerides
Aldana et al. (2003)	*N* = 141 (*n* = 28)	Low-fat vegetarian diet, stress management, exercise, group meetings	Ornish	Weight, BMI, waist to hip ratio, LDL, fat intake		TC, HDL, triglycerides
	n = 58, supervised hospital/clinic rehabilitation	Traditional cardiac rehabilitation program	Rehabilitation	Waist to hip ratio, HDL	Weight, BMI	SBP, DBP, TC, LDL, triglycerides
	n = 55		Control		SBP, blood glucose, LDL, waist to hip ratio, fat intake	DBP, TC, HDL, triglycerides

Note. SBP, systolic blood pressure; DBP, diastolic blood pressure; AHA, American Heart Association; RN, registered nurse; MD, doctor of medicine; TC, total cholesterol; LDL, low-density lipoprotein; HDL,high-density lipoprotein; BMI, body mass index.

Lisspers et al. (1999) developed a lifestyle change cardiac rehabilitation program for patients under 60 years who had MI, CABG, or PCI. This comprehensive 12-month program began with a 4-week inpatient stay and involved (a) health education on stress, diet, exercise, and smoking cessation, (b) behavior change, (c) skills training, (d) practicing new habits, (e) group and individual counseling, and (f) relapse prevention. Each participant had a designated registered nurse as a personal coach. Data were collected at baseline, 4 weeks, and 12 months on a broad range of lifestyle, biologic, and psychological risk factors and outcomes. Lipids improved at 4 weeks and 12 months. Twelve-month means for TC had decreased from 6.4 to 5.8 mmol/L (248–224 mg/dL), triglycerides decreased from 2.3 to 2.0 mmol/L (89–77 mg/dL), and the LDL/HDL ratio decreased from 4.3 to 3.8 mmol/L (166–147 mg/dL), all $p < .0001$. BMI was decreased by 4 weeks and maintained until the 12-month follow-up, when the mean BMI was 26. Sixty percent of smokers quit during the program and had not resumed by 12 months. Although the results demonstrated considerable improvement, there was no control group for comparison.

Vale, Jelinek, Best, and Santamaria (2002) also used coaching in an effort to close the treatment gap and achieve recommended target cholesterol levels. Patients who were hospitalized for PCI or CABG at a single teaching hospital in Australia were assigned to two groups by random numbers and stratified by type of procedure. The control group received usual care, while the intervention group received usual care as well as the coaching intervention. The coaching was targeted at the participants, who were expected to know their risk factors and risk factor goals and to ask for medical therapy from their primary care provider as appropriate. Participants in the intervention group were contacted by the coach by phone 2 weeks after randomization and then three additional times at 6-week intervals, with a reminder call at 24 weeks to schedule the 6-month blood sample. Control group participants were contacted 2 weeks after randomization for a “how are you?” phone call and then at 24 weeks to schedule the 6-month blood sample. Both groups were encouraged to participate in a separate cardiac rehabilitation program.

Each of the coaching interventions followed a quality improvement cycle that involved (a) asking questions to evaluate participants’ knowledge, attitudes, and beliefs about their risk factors, (b) educating as needed and explaining the treatments recommended to achieve risk factor goals, (c) training in assertiveness to assist in receiving information from the treating physician as well as requesting appropriate medication therapy, (d) setting goals for the next coaching session and negotiating a plan of action, and (e) reassessing at the next coaching session. All coaching sessions were conducted by the lead author, a dietician with educational and cardiovascular experience (Vale et al., 2002).

The two groups were comparative at baseline, but at 6 months the intervention group's TC levels were significantly less than the control group’s, and 31% of coached participants compared to 10% of control participants achieved the target TC of less than 4.5 mmol/L (174 mg/dL), the recommended Australian goal. Baseline TC, coaching, and medication therapy were the independent predictors of endpoint TC; however, there were no significant differences between groups in the prescription or dosage of lipid-lowering drugs at 6 months. Neither the type of revascularization procedure nor participation in cardiac rehabilitation affected TC (Vale et al., 2002).

Several limitations of Vale et al.'s 2002 study (participant recruitment from a single medical center, the intervention's implementation by a single coach, and a single time frame for follow-up on selected risk factors) were resolved in the expansion of the project by Vale et al. in 2003. Six additional coaches were trained, and each coach conducted interventions with participants from six university teaching hospitals, one coach per hospital. The focus in this study was the change in TC over a 6-month period as well as the effect of coaching on multiple risk factors. As in the pilot study (Vale et al., 2002), participants in the intervention group were expected to know their personal risk factors and risk factor goals and how to achieve them, and to see their healthcare provider and request appropriate medication therapy. Intervention group participants were also expected to follow recommended therapeutic lifestyle changes, with anticipated better adherence to diet recommendations and the treatment plan prescribed by their provider (Vale et al., 2003).

Each hospital recruited 140 patients who had CABG, PCI, MI, or angiography with planned coronary artery revascularization; after obtaining informed consent, 792 were randomized to either the coaching or control group. Baseline data were collected by review of medical records, interviews, and diet and psychological questionnaires while participants were inpatients. Participants were assigned to groups by random numbers and stratified by procedure. The intervention group was mailed a copy of their individual risk factor levels (e.g., BMI classification as low, moderate, or high risk) and a chart of risk factor goals. A copy of the risk factor target chart was mailed to the primary care provider for both the intervention and control groups. Intervention group participants received coaching sessions by phone (as described above) at 2 weeks, followed by three sessions at 6-week intervals and a final call at 24 weeks to arrange for the 6-month risk factor assessment. Targeted risk factors were expanded to include not only TC but also smoking cessation, BP, fasting blood glucose, BMI, saturated fat intake, and physical activity in accordance with Australian national guidelines. The usual care group was only contacted at 24 weeks to arrange for the 6-month risk factor assessment (Vale et al., 2003).

There were no significant differences between the two groups at baseline; however, at 6 months the intervention group had significantly decreased their TC an average of 0.54 mmol/L compared to 0.18 mmol/L in the control group (21 vs 7 mg/dL). Compared with the control group, coached participants had significantly greater improvement in weight, BMI, total fat, saturated fat, and cholesterol intake, and increased walking frequency (but not longer duration). There was no statistically significant difference in fasting blood glucose, smoking cessation, and cardiac rehabilitation attendance between the groups (Vale et al., 2003). In contrast to the pilot study (Vale et al., 2002), at 6 months more participants in the intervention group were on statins for cholesterol reduction; however, the effect of coaching on TC was significant, with $p < .0001$ (Vale et al., 2003).

Gleason et al. (2002) conducted a more focused study examining LDL and weight changes. The authors investigated whether home-delivered prepared meals and telephone diet education to patients diagnosed with CHD (defined as MI, coronary artery revascularization, angiography, or angina with a positive stress test) would improve dietary compliance and quality of life while reducing LDL cholesterol and weight. Patients with diabetes mellitus, uncontrolled angina, or HTN were excluded from this 8-week study. Participants were called weekly for encouragement, feedback on progress, and an opportunity to ask questions. Participants were also given written information on physical activity, walking, beverages, recipes, and tips for shopping, eating out, and snacking. For the first 4 weeks, lunch and dinner were provided as prepared meals. For the second half of the study, suggestions were made for appropriate lunch substitutions and dinner was delivered as prepared meals. Menu plans met the National Cholesterol Education Program (NCEP) Step II Diet guidelines. At 8 weeks, total and LDL cholesterol, weight, and BMI were significantly reduced, with no significant changes in triglycerides or HDL cholesterol. The 8-

week follow-up period and lack of a control group limit the strength of the findings. The intervention itself (i.e., providing prepared meals) may have limited utility in clinical practice.

Masley, Phillips, and Copeland (2001) also studied dietary changes. The focus was on encouraging patients with coronary artery disease (based on unspecified hospital coding data) to increase their consumption of fruits, vegetables, and legumes while changing fat intake to more monounsaturated and n-3 fatty acid sources. Participants were divided into two groups with equivalent LDL cholesterol levels and then randomly assigned to either the intervention or control group. The intervention group participated in free group classes once a week for the first month and then monthly for a year. Classes were taught by a licensed practical nurse and involved diet education, cooking demonstrations, and encouragement to be physically active. They also received a textbook with shopping lists, menu plans, and food-monitoring sheets. Control group participants received handouts on the NCEP Step II or III Diet and American Heart Association menu plans but no group visits. Fasting lipids and hemoglobin A1c levels were collected at baseline and 12 months, while food questionnaires were collected at baseline, 3 months, and 12 months.

The intervention group had a significant increase in their self-reported consumption of fruits and vegetables compared to baseline and a significant 45% increase in the use of monounsaturated cooking oils compared with a 1% increase in the control group. The intervention group also significantly reduced LDL levels by 0.34 mmol/L (13 mg/dL). However, the reduction was not significantly greater than that seen in the control group. Changes in TC/HDL ratio, HDL cholesterol, and triglyceride levels were not significantly different. The self-reported dietary results introduce potential bias, and results of this study should be interpreted cautiously because the study had inadequate power because of a higher than expected dropout rate. The researchers calculated that of the 120 participants recruited, 23 could withdraw without decreasing the power below .80; however, 30 participants withdrew from the study (Masley et al., 2001).

Discussion

Management strategies

All the interventions studied involved contact with a healthcare professional more frequently than is commonly seen in usual care, through either phone calls, office visits, or group visits. Although several studies had a control group, none of the control groups received contact with a healthcare professional as often as the intervention groups (Aldana et al., 2003; Masley et al., 2001; Ornish et al., 1990; Vale et al., 2002, 2003; Wallner et al., 1999), making it difficult to determine to what degree the frequency of contact influenced the success of the interventions implemented. Possibly, the accountability inherent in meeting or talking with a healthcare professional had an additive effect in helping the participants continue the recommended therapeutic lifestyle changes.

While lipid-lowering medications have become a mainstay of CHD management in the past several years, these studies demonstrate that therapeutic lifestyle change is still beneficial for risk factor management. Although Vale et al. (2003) found medication therapy to have the single greatest effect on TC levels, the coaching intervention that encompassed both appropriate medication therapy and therapeutic lifestyle change had an independent, statistically significant ($p < .001$) effect on lowering cholesterol as well as other risk factors.

All studies reviewed had some level of education about a heart-healthy diet, but four studies specifically involved nutritionists in direct contact with participants (Gleason et al., 2002; Vale et al., 2002, 2003; Wallner et al., 1999). Several others involved registered or licensed practical nurses in patient education and management (Aldana et al., 2003; Gordon et al., 2002; Lisspers et al., 1999; Masley et al., 2001; Vale et al., 2003); one study used exercise physiologists to deliver diet and lifestyle information (Gordon et al.). Although risk factor improvement was seen in all studies regardless of the healthcare professional providing the patient education, these assistants were highly trained to provide the specific intervention implemented. Further research on the effect of education by healthcare professionals of different specialties is warranted.

Various methods were used to encourage increased physical activity. Some participants were given verbal advice or written information (Gleason et al., 2002; Lisspers et al., 1999; Masley et al., 2001; Wallner et al., 1999), but other studies encouraged participation in a cardiac rehabilitation program (Vale et al., 2002, 2003), prescribed individual exercise plans (Gordon et al., 2002; Ornish et al., 1990), or involved group exercise (Aldana et al., 2003).

The three studies that examined smoking behavior reported mixed results. Lisspers et al. (1999) reported that through extensive education and lifestyle change coaching with both individual and group meetings, 60% of smokers quit smoking during the study. In Gordon et al.'s (2002) comparison of cardiac rehabilitation, nurse case management, and a community-based program, 16 participants were smoking at baseline and 4 quit during the course of the program. There were no differences in smoking cessation rates between the three groups; however, it was a small number of participants who were smoking. Similarly, Vale et al. (2003) found the coaching intervention had no significant effect on smoking cessation (see Tables 1 and 2).

Recent research suggests other interventions may be equally effective when compared to cardiac rehabilitation. Gordon et al. (2002) found that physician-supervised nurse case management, a community-based program run by exercise physiologists, and cardiac rehabilitation all significantly improved participants' systolic and diastolic BP, total and LDL cholesterol, and weight. In contrast, in Aldana et al.'s (2003) study comparing the Ornish program with cardiac rehabilitation and a control group, participants in rehabilitation significantly improved their waist to hip ratio and HDL levels but also significantly worsened weight, BMI, and BP (see Table 2). Aldana et al. concluded that except for increased HDL levels, the rehabilitation group's risk level was similar to the control group's, who either had no change or experienced worsening of their risk factor status during the study. In both studies, Vale et al. (2003, 2002) found that for those participants who chose to participate in cardiac rehabilitation, the rehabilitation had no effect on their TC levels.

Summary

The connection between minimizing CHD risk factors and reducing morbidity and mortality is well established. CHD's rank as the leading cause of death and the high prevalence of modifiable risk factors makes it imperative for healthcare providers to eliminate the treatment gap between evidence-based recommendations and actual clinical practice. Current strategies for achieving recommended target risk factor levels include frequent follow-up, intensive diet changes, individualized and group exercise, coaching, group meetings, education on lifestyle modification and behavior change, and formal cardiac rehabilitation programs.

Recommendations for practice

Although many of the interventions performed in the reviewed studies may be impractical to implement as described, they can be modified and applied in daily practice. If healthcare providers can assist their patients in achieving therapeutic lifestyle change, they can close the treatment gap by bringing current clinical practice in line with evidence-based recommendations, resulting in healthier lives for patients and their families.

One strategy that all studies had in common was increased contact with a healthcare provider. When implementing therapeutic lifestyle change aimed at any risk factor, healthcare providers should schedule frequent and regular follow-up (e.g., monthly) to monitor progress and provide time for questions and encouragement, either in person or by telephone. Providers can offer support groups for patients in their practice who are implementing therapeutic lifestyle change or encourage patients to attend groups outside the medical arena, such as local senior centers, YMCAs, or Weight Watcher's meetings.

Special attention should be given to implementing therapeutic lifestyle change in addition to medication therapy. It should be emphasized to patients that the beginning of medication is not the end of therapeutic lifestyle change; they are “equal, independent and additive in their effects” (Vale et al., 2002, p. 249). Strategies need to be personalized to individual patients, considering their other health problems and risks as well as cultural and financial issues that influence behavior change. Involving the patient in goal setting and writing down the plan of action (such as an individualized exercise plan) gives the patient concrete steps to follow and illustrates the importance the provider places on therapeutic lifestyle change. Although evidence suggests that other methods of achieving therapeutic lifestyle change can produce benefits that are similar to those seen with cardiac rehabilitation, healthcare providers should continue to refer patients to cardiac rehabilitation programs while also implementing other strategies for lifestyle change.

Implications for nurse practitioners

As healthcare providers specifically trained in health promotion, patient education, and communication skills, NPs are ideally suited to implement these strategies in their patient populations. NPs in direct patient care can use their knowledge of the patient and family to personalize care and negotiate goals and plans of action agreeable to the patient, as well as to start and manage appropriate medication therapy. NPs can also help close the treatment gap between evidence-based recommendations and clinical practice by implementing education programs in medical practices and the community, promoting public and workplace policies that support a healthy lifestyle and performing new research in the effort to control and cure CHD. Using these strategies, NPs can promote positive change toward minimizing the effect of CHD, creating a healthier society.

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